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Rising Returns to Schooling in Argentina, 1992-2002

Productivity or Credentialism?

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Abstract: There has not been much change in the premium to primary education, while the returns to secondary education increased, but by less than the premium to university. The returns to incomplete university also increased significantly. There is a signal that there might be credentialism at the tertiary level, but 15 years of schooling also represents a significant threshold. The returns to schooling are higher in the private sector. There is little evidence of screening or credentialism driving the returns to schooling, which increased significantly in Argentina from 1992 to 2002.

JEL Classification Codes: I21, J31

Keywords: Returns to schooling, Argentina, screening, credentialism

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Introduction

The returns to schooling in Argentina increased over the last decade. The overall rate of return to an additional year of schooling increased from 8.6 percent in 1992 to 11.4 percent in 2002 (Giovagnoli, Fiszbein and Patrinos 2005). This represents a 32 percent increase in 10 years, a large increase as compared to most countries (Psacharopoulos and Patrinos 2004).

The returns to primary schooling remained unchanged during this decade, as did the (already low) returns to incomplete secondary schooling (Table 1). The returns to complete secondary education increased, but not nearly by as much as did the returns to university education – complete or incomplete. While complete university education has a high rate of return, the rate of return for incomplete university education increased at a faster rate in the 1992-2002 period. For example, in 1992, the highest private returns were for primary schooling. By 2002, the highest returns were for complete university education, followed by incomplete university.[1]

Table 1: Argentina: Private Rates of Return to Schooling by Level

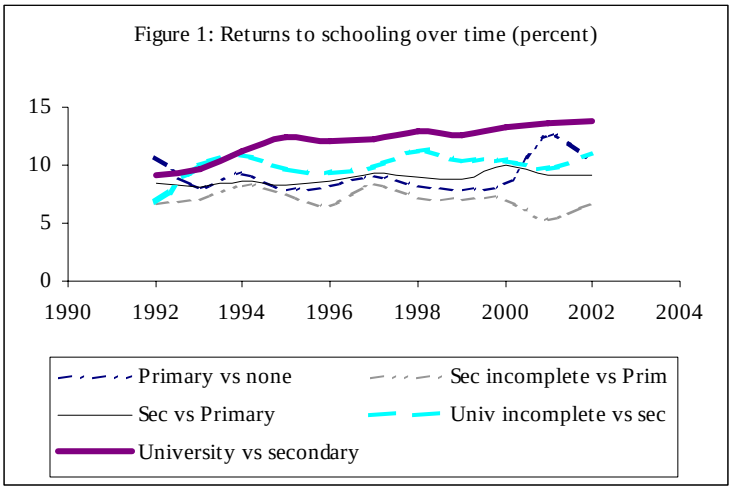
Education Level	1992	2002
Primary versus none	10.7	10.6
Secondary incomplete versus primary	6.8	6.7
Secondary versus primary	8.5	9.2
Incomplete university versus secondary	6.9	11.1
Complete University versus secondary	9.2	13.8

Source: Giovagnoli, Fiszbein and Patrinos 2005

[1] In April 2002, Argentina launched a social safety net program to alleviate the impact of rising unemployment due to the sharp worsening of the economic crisis. The *Jefes de Hogar* program provides a stipend of 150 Argentine *pesos* a month to an unemployed head of a household in exchange for participation in four hours of work in community services, small construction or maintenance activities, or training, including finishing basic education, or as a temporary employee of a private company. Program beneficiaries are considered as officially employed, so they are included in the analysis. However, taking them out, which means a 7 percent reduction of the sample, mostly concentrated with less than secondary schooling, does not affect the results very much. The overall returns to schooling increase slightly. But the basic findings remain the same. See Appendix for results without *Jefes* participants.

Over time, the returns to university education have increased consistently (Figure 1). The returns to incomplete university fluctuated over time, but overall have shown a tremendous increase from 1992. The returns to primary were very flat for most of the 1990s, but have increased sharply in the early years of the 21st century.

Figure 1: Returns to schooling over time (percent)



What accounts for the overall increasing returns to schooling in Argentina? Clearly, much of the overall rate of return to schooling has been driven by complete and incomplete university education. One test for credentialism (or screening) would be to look at the returns to schooling for people with a complete education versus those who dropped out (Layard and Psacharopoulos 1974). In order to control for the fact that those with incomplete levels of schooling have attained various years of schooling, we also control for both levels and years. A third test accounts for the timing of the dropout decision by examining year-to-year returns and looking for discontinuities in the estimates at years corresponding to the termination of levels (Hungerford and Solon 1987; Griffin and Cox Edwards 1993; Patrinos 1996; Jaeger and Page 1996; Arabsheibani and Manfor 2001; Mora 2003). Finally, we test what has come to be known as the "weak versus the strong version of the screening hypothesis." This hypothesis draws a distinction between the weak and the strong version of the screening hypothesis, depending on

whether employers pay irrational wages at the initial hiring point (weak) or continuously thereafter (strong) (Psacharopoulos 1979). Heywood and Wei (2004) provide new estimates for Hong Kong, along with a very useful summary of empirical results, showing how mixed the evidence is and how it depends on the tests used.

Our paper contributes to the literature by adding new estimates for a middle-income developing country. The paper makes a further contribution by looking for evidence of screening, credentialism and non-linearities over time for the same country.

Credentialism or Productivity?

In the case of both secondary and university education, it would appear that there is a premium for completing the level. Given that we are interested in examining the reason for the increase over time, the analysis is undertaken for three periods: 1992, 1998 and 2002 (Annex Table 1. We estimate returns to schooling, comparing complete and incomplete university and secondary education. Clearly, there has not been much change in the premium to primary education. The returns to secondary incomplete have not changed. There was some upward movement in the returns to complete secondary from 1998 to 2002, but overall not very much.

Nevertheless, even if there is a level of credentialism in the system, the question is does this account for the increase in the returns to schooling over time? However, while the gap in returns between secondary complete and secondary incomplete has increased somewhat over time, the gap between university complete and university incomplete has actually decreased over

time. Thus, there is no immediate strong evidence of credentialism driving the returns to schooling.

Years and Levels

In order to control for the fact that those with incomplete levels of schooling have attained various years of schooling, we control for both levels and years (Table 2). The variables primary complete, secondary complete and tertiary complete are dummy variables that take the value 1 when that is the highest level of education achieved. The variables years of primary, secondary and tertiary take the value of the number of years achieved, but instead of being all in one variable (years of education) it is split into three variables. Therefore, a person with secondary incomplete (for example, 11 years) will have a value of 7 in years of primary, a value of 4 in years of secondary and 0 in years of tertiary and the three dummy variables.

The returns to primary complete have decreased slightly (but are insignificant); however, the returns to years of primary have increased. The returns to secondary complete increased, but the returns to years of schooling at the secondary level have decreased slightly. The returns to complete tertiary education increased, and by more than did years of tertiary education. This gives some indication of credentialism at the secondary and tertiary levels, but not at primary.

Table 2: Earnings Functions: Level and Years

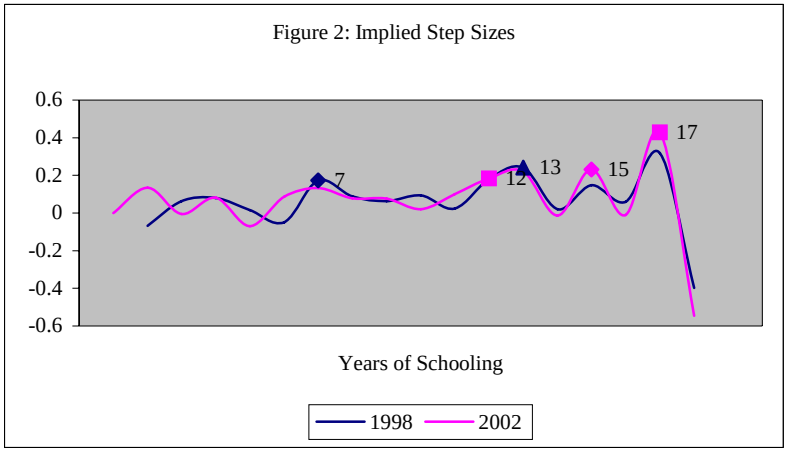
	1998		2002	
	Estimated Coefficient	Standard Error	Estimated Coefficient	Standard Error
Primary complete	0.028	0.025	0.021	0.035
Secondary complete	0.033	0.024	0.095	0.031
Tertiary complete	0.110	0.029	0.160	0.036
Years of primary	0.044	0.007	0.054	0.010
Years of secondary	0.089	0.008	0.077	0.010
Years of tertiary	0.137	0.008	0.153	0.011
Experience	0.042	0.002	0.040	0.002
Experience-squared	-0.001	0.000	-0.001	0.000
Constant	-0.379	0.041	-0.607	0.056
R^2	0.283		0.282	
N	14,485		9,309	

Source: EPH

Testing for Non-Linearities

The methods used thus far may not account for the timing of the dropout decision. Another technique used is to look at year-to-year returns and examine if there are discontinuities in the estimates at years corresponding to the termination of levels. We estimate year-to-year returns to schooling in order to detect discontinuities at years corresponding to levels, or non-linearities in the returns to education, which could be taken as evidence of "sheepskin effects" (see Annex Table 2). This method provides even weaker evidence of any credentialism. There do not appear to be significant increases associated with years of schooling that would represent the attainment of a primary or secondary certificate. The only signal that there might be credentialism occurs at 17 years of schooling which could be argued represents the attainment of a tertiary education degree. The implied step sizes according to levels of schooling indicate spikes at years 7, 12 and 17 for primary, secondary and tertiary (see Figure 2). Curiously, 15 years of schooling represents a significant "threshold" in 2002 (but not in 1998).[2]

[2] Excluding *Jefes* does not alter the conclusions. In fact, the same step sizes are estimated. Further, the steps at some non-credential years actually increase slightly (see Appendix A).



Others have also found evidence of thresholds associated with non-certificate years, such as Arabsheibani and Manfor (2001) for Libya, Patrinos (1996) for Guatemala and Griffin and Cox Edwards (1993) for Brazil.

Weak versus Strong Screening

We also test what has come to be known as the "weak versus the strong version of the screening hypothesis." This hypothesis draws a distinction between the weak and the strong version of the screening hypothesis, depending on whether employers pay irrational wages at the initial hiring point (weak) or continuously thereafter (strong). The empirical strategy is to split the sample into public and private employment and compare the returns by sector of employment. The returns to another year of schooling are also higher in the private sector, but the rate of change is about equal for both sectors between 1998 and 2002 (Table 3). The returns to schooling in 1998 were more than 10 percent in the private sector, and less than 9 percent in the public sector. In 2002, the returns to schooling in the public sector increased to 10 percent, but surpassed 11 percent in the private sector.

We also examine returns by level of schooling for both sectors (Table 4). In 1998, the returns to schooling for each level – complete and incomplete – were higher in the private sector. By 2002, the returns to primary and secondary (incomplete and complete) schooling were higher in the public sector. The returns to tertiary incomplete actually decreased significantly in the public sector. The returns to tertiary complete increased in both sectors. However, there was no change in the returns to tertiary incomplete in the private sector. Thus, much of the increase in the returns to schooling overall is due to the increase in the returns to tertiary education. The rates of increases, however, were higher in the public sector. This provides little evidence of screening since the private sector seeks to maximize profits and hence recognizes the higher productivity of the more educated relative to the public sector that tends to reward on a pay-scale basis regardless of productivity. Therefore, again there is little evidence of credentialism driving the returns to schooling.[3]

Table 3: Determinants of Earnings by Sector of Employment

	Public		Private	
1998	Estimated coefficient	Standard error	Estimated coefficient	Standard error
Years of education	0.089	0.003	0.101	0.002
Experience	0.033	0.003	0.038	0.002
Experience-squared	-0.001	0.001	-0.001	0.000
Constant	-0.327	0.049	-0.777	0.029
R^2	0.244		0.224	
N	3,667		10,778	
2002	Estimated coefficient	Standard error	Estimated coefficient	Standard error
Years of education	0.099	0.003	0.111	0.003
Experience	0.036	0.003	0.036	0.003
Experience-squared	-0.001	0.001	-0.001	0.001
Constant	-0.669	0.049	-1.061	0.044
R^2	0.323		0.216	
N	3,085		6,178	

Source: EPH

[3] Excluding the *Jefes* beneficiaries does not alter the conclusions but rather strengthens them. Few *Jefes* beneficiaries work in the private sector, so the estimated coefficients for the private sector remain the same. But the returns in the public sector decrease. *Jefes* beneficiaries are less educated and tend to increase the variation in wages, thus increasing the returns to schooling in the public sector. Excluding them tends to reduce returns in the public sector (see Appendix A).

Table 4: Determinants of Earnings by Level and by Sector

	Public		Private	
1998	Estimated coefficient	Standard error	Estimated coefficient	Standard error
Primary complete	0.143	0.054	0.178	0.025
Secondary incomplete	0.323	0.056	0.354	0.027
Secondary complete	0.524	0.055	0.595	0.028
Tertiary incomplete	0.728	0.060	0.934	0.033
Tertiary complete	0.978	0.055	1.311	0.031
Experience	0.037	0.003	0.041	0.002
Experience-squared	-0.001	0.001	-0.001	0.000
Constant	0.145	0.059	-0.245	0.030
R^2	0.241		0.232	
N	3,667		10,778	
2002	Estimated coefficient	Standard error	Estimated coefficient	Standard error
Primary complete	0.237	0.047	0.190	0.037
Secondary incomplete	0.423	0.050	0.351	0.040
Secondary complete	0.674	0.048	0.622	0.040
Tertiary incomplete	0.837	0.055	0.954	0.047
Tertiary complete	1.185	0.049	1.394	0.045
Experience	0.034	0.003	0.038	0.003
Experience-squared	-0.001	0.001	-0.001	0.001
Constant	-0.158	0.055	-0.443	0.044
R^2	0.321		0.225	
N	3,085		6,178	

Source: EPH

The results are in line with what is found in most other developing countries, including the studies reviewed by Heywood and Wei (2004), and those reported in Mehta and Villarreal (2003, 2004) for Mexico, although Mora (2003) finds evidence of screening in the Colombian labor market. There is more evidence of screening in higher-income, developed countries (see also Ferrer and Riddell 2002; Sanmartin 2001; Jaeger and Page 1996; Hungerford and Solon 1987), such as Canada, Spain and the United States. However, Chevalier and others (2004), using changes in the compulsory school leaving age in the United Kingdom, find no support for the screening hypothesis.

Conclusions

The returns to schooling in Argentina increased over the last decade. The premium to completing each level of schooling shows that there has not been much change in the premium to

primary education, while the returns to complete secondary increased, but not by very much compared to the premium to complete university. However, the returns to incomplete university have also increased significantly. There do not appear to be significant increases associated with years of schooling that would represent the attainment of a primary or secondary certificate. The only signal that there might be credentialism occurs at 17 years of schooling which could be argued represents the attainment of a tertiary education degree. However, 15 years of schooling also represents a significant "threshold" in 2002.

The returns to schooling are higher in the private sector. Much of the increase in the returns to schooling overall is due to the increase in the returns to tertiary education. The returns to complete university are higher in the private sector. This provides no evidence of screening since the private sector seeks to maximize profits and recognizes the higher productivity of the more educated. Overall, there is little evidence of credentialism driving the returns to schooling. What this paper also shows is that over time, screening or credentialism does not explain much of the increase in the returns to schooling documented in Argentina from 1992 to 2002.

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Annex Table 1: Determinants of Earnings by Level

	1992		1998		2002	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Primary Complete	0.213	0.018	0.194	0.023	0.218	0.030
Secondary Incomplete	0.382	0.020	0.383	0.024	0.386	0.032
Secondary Complete	0.636	0.020	0.641	0.024	0.674	0.032
Tertiary Incomplete	0.807	0.026	0.955	0.028	0.956	0.037
Tertiary Complete	1.095	0.024	1.293	0.026	1.368	0.033
Experience	0.041	0.001	0.043	0.002	0.040	0.002
Experience^2	-0.001	0.000	-0.001	0.000	-0.001	0.000
Constant	0.105	0.022	-0.244	0.026	-0.422	0.035
R^2	0.200		0.273		0.270	
N	15,693		14,485		9,309	

Source: EPH

Annex Table 2: Estimated Coefficients (and Standard Errors) in Regression of Log Hourly Earnings as Step Function of Years of Schooling, 1998 and 2002

	1998			2002		
Variable	Coefficient	Standard Error	Implied Step Size	Coefficient	Standard Error	Implied Step Size
S=1	0.074	0.101		0.109	0.142	
S=2	0.006	0.080	-0.070	0.243	0.118	0.134
S=3	0.068	0.075	0.062	0.238	0.112	-0.005
S=4	0.148	0.076	0.081	0.319	0.114	0.081
S=5	0.164	0.079	0.016	0.250	0.117	-0.070
S=6	0.116	0.085	-0.049	0.336	0.128	0.086
S=7	0.290	0.065	0.174	0.468	0.102	0.132
S=8	0.377	0.070	0.088	0.546	0.108	0.078
S=9	0.440	0.068	0.063	0.622	0.105	0.076
S=10	0.533	0.068	0.093	0.642	0.105	0.020
S=11	0.556	0.072	0.023	0.743	0.109	0.101
S=12	0.737	0.066	0.181	0.927	0.102	0.184
S=13	0.979	0.074	0.242	1.147	0.111	0.221
S=14	0.999	0.072	0.020	1.134	0.109	-0.013
S=15	1.146	0.068	0.147	1.365	0.104	0.231
S=16	1.205	0.081	0.059	1.355	0.117	-0.010
S=17	1.523	0.067	0.318	1.782	0.104	0.428
S=18	1.126	0.227	-0.398	1.237	0.405	-0.546
Experience	0.043	0.002		0.041	0.002	
Experience^2	-0.001	0.000		-0.001	0.000	
Constant	-0.340	0.067		-0.688	0.103	
R^2	0.284			0.283		
N	14,485			9,309		

Source: EPH

Appendix A

Earnings function without *Jefes* beneficiaries, 2002

	Coefficient	Standard Error
Primary complete	0.235	0.033
Secondary incomplete	0.417	0.035
Secondary complete	0.720	0.035
Tertiary incomplete	1.012	0.040
Tertiary complete	1.402	0.036
Experience	0.042	0.002
Experience-squared	-0.001	0.000
Constant	-0.477	0.038
N	8,657	
R-squared	0.273	

Source: EPH

Earnings function, years and levels, without *Jefes*, 2002

	Coefficient	Standard Error
Primary complete	0.022	0.038
Secondary complete	0.091	0.033
Tertiary complete	0.148	0.037
Years of primary	0.059	0.011
Years of secondary	0.084	0.011
Years of tertiary	0.152	0.011
Experience	0.042	0.002
Experience-squared	-0.001	0.000
Constant	-0.683	0.062
N	8,657	
R-squared	0.284	

Source: EPH

Estimated Coefficients and Implied Step Sizes associated with Years of Schooling, with and without *Jefes*						
	1998		2002		without *Jefes* 2002	
S=	Coefficient	Step	Coefficient	Step	Coefficient	Step
1	0.074		0.108		0.150	
2	0.006	-0.069	0.243	0.134	0.316	0.166
3	0.068	0.062	0.238	-0.005	0.294	-0.022
4	0.148	0.081	0.319	0.081	0.390	0.096
5	0.164	0.016	0.250	-0.070	0.312	-0.078
6	0.116	-0.049	0.336	0.086	0.420	0.108
7	0.290	0.174	0.468	0.132	0.548	0.128
8	0.377	0.088	0.546	0.078	0.633	0.085
9	0.440	0.063	0.622	0.076	0.714	0.080
10	0.533	0.093	0.642	0.020	0.739	0.025
11	0.556	0.023	0.743	0.101	0.836	0.098
12	0.737	0.181	0.926	0.184	1.036	0.200
13	0.979	0.242	1.147	0.221	1.296	0.260
14	0.999	0.020	1.134	-0.013	1.242	-0.054
15	1.146	0.147	1.365	0.231	1.469	0.227
16	1.205	0.059	1.355	-0.010	1.460	-0.009
17	1.523	0.318	1.782	0.428	1.877	0.417
18	1.126	-0.398	1.237	-0.546	1.339	-0.538
Experience	0.043		0.041		0.043	
Experience-squared	-0.001		-0.001		-0.001	
Constant	-0.340		-0.688		-0.806	
R^2	0.284		0.283		0.286	
N	14,485		9,309		8,657	

Source: EPH

Returns to Schooling, Private and public, with and without *Jefes*, 2002

	All			Without *Jefes*		
	Total	Public	Private	Total	Public	Private
Years of Schooling	11.3	9.9	11.1	11.7	9.1	11.1
Primary vs. None	10.9	11.8	9.5	11.7	11.2	9.7
Secondary Incomplete vs. Primary	6.8	7.4	6.4	7.3	6.6	6.5
Secondary Complete vs. Primary	9.1	8.7	8.6	9.7	7.8	8.7
Tertiary Incomplete vs. Secondary	11.3	6.5	13.3	11.7	6.0	13.4
Tertiary Complete vs. Secondary	13.9	10.2	15.5	13.6	8.7	15.5
N	9,309	3,085	6,178	8,657	2,517	6,106

Source: EPH